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# Report of the individual review of the annual submission of the Netherlands submitted in 2013*

* In the symbol for this document, 2013 refers to the year in which the inventory was submitted, and not to the year of publication.

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# Contents


| | | *Paragraphs* | *Page* |
|---|---|---|---|
| I. | Introduction and summary | 1–5 | 3 |
| II. | Technical assessment of the annual submission | 6–82 | 7 |
| | A. Overview | 6–20 | 7 |
| | B. Energy | 21–37 | 13 |
| | C. Industrial processes and solvent and other product use | 38–46 | 17 |
| | D. Agriculture | 47–57 | 19 |
| | E. Land use, land-use change and forestry | 58–63 | 22 |
| | F. Waste | 64–68 | 23 |
| | G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol | 69–82 | 24 |
| III. | Conclusions and recommendations | 83–84 | 27 |
| | A. Conclusions | 83 | 27 |
| | B. Recommendations | 84 | 28 |
| IV. | Questions of implementation | 85 | 32 |
| Annexes | | | |
| I. | Background data on recalculations and information to be included in the compilation and accounting database | | 33 |
| II. | Documents and information used during the review | | 39 |
| III. | Acronyms and abbreviations | | 41 |

# I. Introduction and summary

1. This report covers the review of the 2013 annual submission of the Netherlands, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 9 to 14 September 2013 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Leena Raittinen (Finland) and Mr. Dennis Rudov (Belarus); energy – Ms. Lindiwe Chola Dlamini (Swaziland), Ms. Veronika Ginzburg (Russian Federation) and Ms. Inga Konstantinaviciute (Lithuania); industrial processes and solvent and other product use – Ms. Siriluk Chiarakorn (Thailand) and Mr. Thapelo C.M. Letete (South Africa); agriculture – Ms. Yauheniya Bertash (Belarus) and Ms. Hongmin Dong (China); land use, land-use change and forestry (LULUCF) – Ms. Maria Fernanda Alcobé (Argentina) and Mr. Vladimir Korotkov (Russian Federation); and waste – Mr. Pavel Gavrilita (Republic of Moldova) and Ms. Tatiana Tugui (Republic of Moldova). Mr. Rudov and Ms. Tugui were the lead reviewers. The review was coordinated by Ms. Suvi Monni (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines), a draft version of this report was communicated to the Government of the Netherlands, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified. The expert review team (ERT) notes that the 2012 annual review report of the Netherlands was published after the submission of the 2013 annual submission.

3. In 2011, the main greenhouse gas (GHG) in the Netherlands was carbon dioxide ($CO_2$), accounting for 86.2 per cent of total GHG emissions[1] expressed in $CO_2$ equivalent ($CO_2$ eq), followed by methane ($CH_4$) (7.9 per cent) and nitrous oxide ($N_2O$) (4.7 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride ($SF_6$) collectively accounted for 1.3 per cent of the overall GHG emissions in the country. The energy sector accounted for 84.3 per cent of total GHG emissions, followed by the agriculture sector (8.2 per cent), the industrial processes sector (5.4 per cent), the waste sector (2.0 per cent) and the solvent and other product use sector (0.1 per cent). Total GHG emissions amounted to 194,379.16 Gg $CO_2$ eq and decreased by 8.8 per cent between the base year[2] and 2011. The ERT concludes that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

4. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively. In table 1, $CO_2$, $CH_4$ and $N_2O$ emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector, and also do not include the emissions from deforestation that were included in the Netherlands' initial report under the Kyoto Protocol for the base year and subsequently used for the calculation of the assigned amount.

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of $CO_2$ eq excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for $CO_2$, $CH_4$ and $N_2O$, and 1995 for HFCs, PFCs and $SF_6$. The base year emissions include emissions from Annex A sources only.

5. Additional background data on recalculations by the Netherlands in the 2013 annual submission, as well as information to be included in the compilation and accounting database, can be found in annex I to this report.

Table 1

**Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year[a] to 2011**

| | | | Gg $CO_2$ eq | | | | | | | Change (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Greenhouse gas | Base year[a] | 1990 | 1995 | 2000 | 2008 | 2009 | 2010 | 2011 | Base year–2011 |
| Annex A sources | | $CO_2$ | 159 235.89 | 159 235.89 | 170 738.03 | 169 920.85 | 175 174.67 | 169 905.87 | 181 380.41 | 167 550.04 | 5.2 |
| | | $CH_4$ | 25 712.42 | 25 712.42 | 24 333.53 | 19 918.23 | 16 084.90 | 16 123.66 | 15 936.10 | 15 261.51 | –40.6 |
| | | $N_2O$ | 19 986.24 | 19 986.24 | 19 880.61 | 17 398.99 | 9 687.13 | 9 425.61 | 9 207.51 | 9 105.29 | –54.4 |
| | | HFCs | 6 018.69 | 4 432.03 | 6 018.69 | 3 891.67 | 1 931.52 | 2 072.04 | 2 259.88 | 2 132.84 | –64.6 |
| | | PFCs | 1 937.82 | 2 264.48 | 1 937.82 | 1 580.60 | 251.07 | 167.97 | 208.86 | 182.85 | –90.6 |
| | | $SF_6$ | 286.78 | 218.28 | 286.78 | 295.33 | 183.79 | 170.38 | 184.10 | 146.63 | –48.9 |
| KP-LULUCF | Article 3.3[b] | $CO_2$ | | | | | 358.68 | 345.75 | 362.89 | 379.33 | |
| | | $CH_4$ | | | | | 0.08 | 0.08 | 0.09 | 0.09 | |
| | | $N_2O$ | | | | | 0.51 | 0.54 | 0.57 | 0.59 | |
| | Article 3.4[c] | $CO_2$ | NA | | | | NA | NA | NA | NA | NA |
| | | $CH_4$ | NA | | | | NA | NA | NA | NA | NA |
| | | $N_2O$ | NA | | | | NA | NA | NA | NA | NA |

*Abbreviations*: KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for $CO_2$, $CH_4$ and $N_2O$, and 1995 for HFCs, PFCs and $SF_6$. The "base year" for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
**Greenhouse gas emissions by sector and activity, base year[a] to 2011**

| | | | *Gg $CO_2$ eq* | | | | | | | *Change (%)* |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Sector* | *Base year[a]* | *1990* | *1995* | *2000* | *2008* | *2009* | *2010* | *2011* | *Base year–2011* |
| Annex A | Energy | 153 773.92 | 153 773.92 | 165 663.58 | 164 698.77 | 171 506.22 | 166 638.01 | 177 856.01 | 163 872.14 | 6.6 |
| | Industrial processes | 23 520.99 | 22 192.49 | 23 566.18 | 20 261.49 | 10 243.41 | 9 957.70 | 10 409.25 | 10 444.88 | –55.6 |
| | Solvent and other product use | 541.19 | 541.19 | 439.85 | 306.94 | 206.58 | 197.75 | 181.19 | 154.50 | –71.5 |
| | Agriculture | 22 557.40 | 22 557.40 | 22 220.10 | 18 849.29 | 16 769.64 | 16 711.62 | 16 638.47 | 16 028.63 | –28.9 |
| | Waste | 12 784.32 | 12 784.32 | 11 305.74 | 8 889.18 | 4 587.23 | 4 360.44 | 4 091.93 | 3 879.01 | –69.7 |
| | LULUCF | NA | 2 999.67 | 2 850.85 | 2 925.28 | 3 025.82 | 2 842.93 | 2 992.57 | 3 265.93 | NA |
| | **Total (with LULUCF)** | **NA** | **214 848.99** | **226 046.30** | **215 930.95** | **206 338.90** | **200 708.46** | **212 169.43** | **197 645.09** | **NA** |
| | **Total (without LULUCF)** | **213 177.82** | **211 849.32** | **223 195.45** | **213 005.67** | **203 313.08** | **197 865.54** | **209 176.86** | **194 379.16** | **–8.8** |
| | Other[b] | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| KP-LULUCF | Article 3.3[c] Afforestation and reforestation | | | | | –403.74 | –441.19 | –449.84 | –458.66 | |
| | Article 3.3[c] Deforestation | | | | | 763.01 | 787.56 | 813.38 | 838.67 | |
| | **Total (3.3)** | | | | | **359.27** | **346.37** | **363.54** | **380.01** | |
| | Article 3.4[d] Forest management | | | | | NA | NA | NA | NA | |
| | Article 3.4[d] Cropland management | NA | | | | NA | NA | NA | NA | NA |
| | Article 3.4[d] Grazing land management | NA | | | | NA | NA | NA | NA | NA |
| | Article 3.4[d] Revegetation | NA | | | | NA | NA | NA | NA | NA |
| | **Total (3.4)** | **NA** | | | | **NA** | **NA** | **NA** | **NA** | **NA** |

*Abbreviations*: KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for $CO_2$, $CH_4$ and $N_2O$, and 1995 for HFCs, PFCs and $SF_6$. The "base year" for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

# II. Technical assessment of the annual submission

## A. Overview

### 1. Annual submission and other sources of information

6. The 2013 annual inventory submission was submitted on 15 April 2013; it contains a complete set of common reporting format (CRF) tables for the period 1990–2011 and an NIR. The Netherlands also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2013. The annual submission was submitted in accordance with decision 15/CMP.1.

7. The Netherlands officially submitted revised emission estimates on 28 October 2013 in response to the list of potential problems and further questions raised by the ERT (see paras. 51 and 55 below). The values used in this report are those submitted by the Netherlands on 28 October 2013.

8. The full list of materials used during the review is provided in annex II to this report.

### 2. Overall assessment of the inventory

9. Table 3 contains the ERT's overall assessment of the annual submission of the Netherlands. For recommendations for improvements related to cross-cutting issues for specific categories, please see the paragraphs cross-referenced in the table.

Table 3
**The expert review team's overall assessment of the annual submission**

| | | *General findings and recommendations* |
|---|---|---|
| The expert review team's (ERT's) findings on completeness of the 2013 annual submission | | |
| Annex A sources[a] | Not complete | Mandatory: $CH_4$ emissions from enteric fermentation for mules and asses (for the period 1990–2009); and $CH_4$ emissions from manure management for mules and asses (for the period 1990–2009) |
| | | Non-mandatory: "NE" is reported for $CO_2$ and $CH_4$ emissions from distribution of oil products; $CO_2$ and $CH_4$ emissions from other (oil); $CO_2$ emissions from other leakage; $CO_2$ emissions from asphalt roofing; $CO_2$ emissions from road paving with asphalt; potential HFC, PFC and $SF_6$ emissions from import, export and destroyed amount; $CH_4$ emissions from enteric fermentation for poultry and other livestock; $N_2O$ emissions from manure management for mules and asses; $N_2O$ |

| | | *General findings and recommendations* |
|---|---|---|
| | | emissions from industrial wastewater; and $N_2O$ emissions from domestic and commercial wastewater (sludge) |
| Land use, land-use change and forestry[c] | Not complete | Mandatory: NE is reported for the carbon stock changes (CSCs) in soils in forest land; CSCs in living biomass (losses) in forest land remaining forest land ("Trees Outside Forests" (TOF)); CSCs in dead organic matter (DOM) in land converted to forest land; CSCs in living biomass (losses) in wetlands, settlements, and other land converted to forest land; CSCs in living biomass in cropland remaining cropland; CSCs in DOM in forest land (TOF), grassland, wetlands, settlements and other land converted to cropland; CSCs in soils in land converted to cropland; CSCs in living biomass (losses) in wetlands, settlements and other land converted to cropland; CSCs in living biomass and soils (subdivision "Nature") in grassland remaining grassland; CSCs in soils in land converted to grassland; CSCs in DOM in forest land (TOF), cropland, wetlands, settlements and other land converted to grassland; CSCs in living biomass (losses) in wetlands, settlements and other land converted to grassland; CSCs in soils in land converted to wetlands; CSCs in living biomass (gains) in land converted to wetlands; CSCs in living biomass (losses) in settlements and other land converted to wetlands; CSCs in living biomass (gains) in land converted to settlements; CSCs in soils and living biomass (gains) in land converted to other land; CSCs in living biomass (losses) in wetlands and settlements converted to other land; $N_2O$ emissions from disturbance associated with land-use conversion to cropland; and $CO_2$, $CH_4$ and $N_2O$ emissions from biomass burning in land converted to cropland, grassland remaining grassland, land converted to grassland and land converted to wetlands |
| | | Non-mandatory: NE is reported for CSCs in DOM in cropland remaining cropland and grassland remaining grassland; CSCs in living biomass, DOM and soils in wetlands remaining wetlands; CSCs in DOM in forest land (TOF), cropland, grassland, settlements and other land converted to wetlands; CSCs in living biomass, DOM and soils in settlements remaining settlements; CSCs in DOM in forest land (TOF), cropland, grassland, wetlands and other land |

| | | *General findings and recommendations* |
|---|---|---|
| | | converted to settlements; CSCs in soils in land converted to settlements; CSCs in DOM in forest land (TOF), cropland, grassland, wetlands and settlements converted to other land; $CH_4$ and $N_2O$ emissions from drainage of soils and wetlands; $CO_2$, $CH_4$ and $N_2O$ emissions from biomass burning (wetlands remaining wetlands, settlements and other land); and $CO_2$, $CH_4$ and $N_2O$ emissions from harvested wood products |
| KP-LULUCF | Complete | |
| The ERT's findings on recalculations and time-series consistency in the 2013 annual submission | Generally consistent | |
| The ERT's findings on verification and quality assurance/quality control procedures in the 2013 annual submission | Sufficient | The ERT identified several inconsistencies between the information in the CRF tables, the NIR and the Monitoring Protocols, including on the methods and EFs used, as well as errors in the use of the notation keys (see paras. 23, 36, 37, 44, 45, 67 and 68 below). The ERT recommends that the Netherlands enhance the effective implementation of the tier 1 QC checks for all sectors<br><br>Additional category-specific findings and recommendations related to QA/QC procedures are presented in paragraphs 26 and 41 below |
| The ERT's findings on the transparency of the 2013 annual submission | Sufficient | See paragraphs 17, 31, 34, 35, 40, 42, 48, 49 and 65 below |

*Abbreviations*: Annex A sources = sources included in Annex A to the Kyoto Protocol, CRF = common reporting format, CSCs = carbon stock changes, DOM = dead organic matter, EF = emission factor, ERT = expert review team, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, "NE" = not estimated, NIR = national inventory report, QA = quality assurance, QC = quality control, TOF = "Trees Outside Forests".

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

## 3. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

10. The NIR described the national system for the preparation of the inventory. The Ministry of Infrastructure and the Environment (IenM) has overall responsibility for climate change policy issues, including the preparation and approval of the national inventory. In addition, IenM has published procedures and Monitoring Protocols that define

the specific roles, responsibilities, tasks and methodologies involved in the inventory development process. The Monitoring Protocols are updated annually, if required.

11. The NL Agency has been designated as the single national entity responsible for coordinating the establishment and maintenance of the national system, as well as for the overall coordination of the quality assurance/quality control (QA/QC) activities, the compilation of the national inventory and its submission to the UNFCCC secretariat and the provision of support to the inventory review process. The NL Agency operates under the Ministry of Economic Affairs.

12. Other institutions involved in the preparation of the national inventory include the National Institute for Public Health and the Environment (RIVM), Statistics Netherlands (CBS), the Netherlands Environmental Assessment Agency, the Netherlands Organization for Applied Scientific Research (TNO), Rijkswaterstaat Environment, the Centre for Water Management, Deltares and several institutions related to the Wageningen University and Research Centre. Each institution performs specific functions under the national system, such as data provision, inventory calculations and/or data storage.

13. According to the NIR, activity data (AD) are provided by various data suppliers including CBS, the Agricultural Economics Institute, individual companies (via electronic annual environmental reports), other institutions and consultants. The provision of relevant data on GHGs is guaranteed through inter-agency agreements, individual contracts or legal requirements.

14. Most of these AD and emissions data are collected, processed and stored at the Pollutants Release and Transfer Register (PRTR) database, which is operated by RIVM. RIVM prepares the GHG inventory part of the NIR with input from experts from the relevant PRTR task forces and from the NL Agency. NL Agency is responsible for the preparation of the NIR chapters on supplementary information under Article 7, paragraph 1 of the Kyoto Protocol.

15. According to the NIR, the Netherlands has developed and implemented a QA/QC programme that is assessed annually and updated as part of the evaluation and improvement cycle for the inventory and national system. The key elements of the programme include the Monitoring Protocols, quality objectives, a QA/QC plan and a time schedule for the implementation of the QA/QC activities.

Inventory preparation

16. Table 4 contains the ERT's assessment of the Netherlands' inventory preparation process.

Table 4
**Assessment of inventory preparation by the Netherlands**

| | | *General findings and recommendations* |
|---|---|---|
| *Key category analysis* | | |
| Was the key category analysis performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice | Yes | Level and trend key category analysis is performed, including and excluding LULUCF |

| | | *General findings and recommendations* |
|---|---|---|
| guidance for LULUCF)? | | |
| Approach followed? | Both tier 1 and tier 2 | |
| Were additional key categories identified using a qualitative approach? | No | |
| Has the Party identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory? | Yes | |
| Does the Party use the key category analysis to prioritize inventory improvements? | Yes | According to the previous review report, the Netherlands explained that it uses the results of the key category analysis to prioritize inventory improvements; however, this information has not been included in the 2013 annual submission. The ERT reiterates the recommendation that the Netherlands document how the results of the key category analysis have been used for the improvement of the inventory |
| Are there any changes to the key category analysis in the latest submission? | No | The Netherlands reported that, compared with the previous year, two new key categories were identified (navigation – $CO_2$ emissions; and enteric fermentation (swine) – $CH_4$ emissions) |
| *Assessment of uncertainty analysis* | | |
| Approach followed? | Tier 1 | The most recent tier 2 uncertainty analysis was carried out in 2006 |
| Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF? | Yes | Despite recommendations in previous review reports, the NIR does not include a clear description of how the results of the uncertainty assessment have been used to prioritize inventory improvement. The ERT encourages the Netherlands to document how the results of the uncertainty analysis have been used for inventory improvement |

| | | *General findings and recommendations* |
|---|---|---|
| | | The uncertainties of the total GHG emissions including LULUCF are equivalent for the level assessment and 0.3 per cent lower for the trend assessment compared with the uncertainty estimates provided in the 2012 annual submission. The reasons for the difference were not clearly explained in the NIR. The ERT encourages the Netherlands to explain any difference in the uncertainty estimates in consecutive annual submissions in the NIR |
| Quantitative uncertainty (including LULUCF) | Level = 3.0%<br>Trend = 2.7% | |
| Quantitative uncertainty (excluding LULUCF) | Level = 3%<br>Trend = 3% | |

*Abbreviations*: ERT = expert review team, GHG = greenhouse gas, IPCC = Intergovernmental Panel on Climate Change, LULUCF = land use, land-use change and forestry, NIR = national inventory report.

Inventory management

17. The ERT noted that the NIR does not include a fully transparent description of the archiving procedures for the inventory. In response to questions raised by the ERT during the review, the Netherlands explained that it has a centralized archiving system, which includes the archiving of disaggregated emission factors (EFs) and AD, the Monitoring Protocols, internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements. The Party further explained that the archiving system is hosted by RIVM and that, during the preparation of the inventory, all data deliveries from the sectoral experts to the database are logged and stored. Disaggregated EFs and AD, and documentation on how these factors and data have been generated are electronically stored and are available at the premises of the relevant sectoral experts at the various institutions (external agencies) involved in the preparation of the inventory. A programme is in place to review the QA/QC procedures and data archiving practices of the external agencies. The institutions that are not accredited according to the International Organization for Standardization (ISO) 9001 standard have the possibility of storing the information in the RIVM archiving system. During the review, the ERT was provided with the requested additional archived information. The ERT recommends that the Netherlands improve the transparency of the annual submission by providing additional information in the NIR on the archiving procedures for the inventory.

## 4. Follow-up to previous reviews

18. An overview table in the NIR lists the major inventory improvements carried out by the Party in response to the recommendations made in the 2011 annual review report, including improving the transparency of the reporting by extending and modifying the content of the NIR, and correcting inconsistencies between the NIR and the CRF tables.

19. The ERT commends the Netherlands for implementing some of the recommendations made in the 2012 annual review report (e.g. the reporting of the apparent energy consumption (excluding non-energy use and feedstocks) in CRF table 1.A(c)). However, most of the recommendations made in the previous review report have not been addressed in the 2013 annual submission, owing to the late finalization of the annual review report, published in August 2013. In response to questions raised by the ERT during the review, the Netherlands provided information on the general process for addressing the recommendations made in the 2012 annual review report and explained that it intends to include, in its next annual submission, a list describing the status of the improvement measures initiated due to the recommendations made in the previous review reports. The ERT recommends that the Netherlands fully implement the recommendations made in the previous review reports. In particular, the ERT recommends that the Party:

(a) Review the appropriateness of the Intergovernmental Panel on Climate Change (IPCC) default EFs used in the energy sector (see para. 24 below);

(b) Estimate the categories currently reported as not estimated ("NE") (see table 3 above and paras. 59–61 below) and reconcile the use of notation keys (see para. 62 below) in the LULUCF sector;

(c) Improve transparency in the energy and waste sectors (see paras. 26, 31, 65 and 66 below);

(d) Improve the QA/QC procedures and continue to perform verification activities in the energy and industrial processes sectors (see paras. 23, 25, 36 and 41 below).

### 5. Areas for further improvement identified by the expert review team

20. During the review, the ERT identified a number of areas for improvement, including some related to specific categories. These are listed in the relevant chapters of this report and in table 8.

## B. Energy

### 1. Sector overview

21. The energy sector is the main sector in the GHG inventory of the Netherlands. In 2011, emissions from the energy sector amounted to 163,872.14 Gg $CO_2$ eq, or 84.3 per cent of total GHG emissions. Since 1990, emissions have increased by 6.6 per cent. The key drivers for the rise in emissions during the period 1990–2011 are the increase in the consumption of natural gas in public electricity and heat production, the increased demand for electricity and the increase in diesel oil consumption in road transportation, reflecting the increase in the vehicle fleet. Compared with 2010, the total sectoral emissions decreased by 7.9 per cent in 2011 due to the mild winter in 2011 in contrast to the cold winter in 2010. The emissions in the energy sector are variable and influenced by temperature patterns and the amount of imported electricity.

22. Within the sector, in 2011, 38.1 per cent of the emissions were from energy industries, followed by 23.0 per cent from other sectors, 21.5 per cent from transport and 15.8 per cent from manufacturing industries and construction. Fugitive emissions from oil and natural gas accounted for 1.0 per cent and fugitive emissions from solid fuels accounted for 0.4 per cent. The remaining 0.2 per cent were from the category other (fuel combustion).

23. The ERT noted some inconsistencies in the information reported in the Monitoring Protocols, the NIR and the CRF tables; for example, according to the Monitoring Protocol "1A1 1A2 1A4: $CO_2$, $N_2O$ and $CH_4$ from stationary combustion of fossil fuels", a tier 2 method was used to estimate $N_2O$ emissions from stationary combustion, while according to the NIR (pages 50, 55 and 68), a tier 1 method was used, and in CRF table summary 3 both tier 1 and tier 2 methods are listed. In addition, in CRF table 8(b) it is indicated that recalculations were performed for $CH_4$ emissions from manufacture of solid fuels and other energy industries (a subcategory of energy industries) due to the use of an improved method (for 2010). However, according to the NIR, no recalculations were carried out in the energy industries category. The ERT reiterates the recommendation made in the previous review report that the Netherlands improve its QC procedures to ensure that all information is consistently reported in the NIR, the CRF tables and other national inventory documentation, such as the Monitoring Protocols, in order to improve the transparency of the inventory.

24. The Netherlands publishes a national fuels list which is available as a link on the website of the NL Agency, and the key fuels and EFs are presented in annex 2 to the NIR. The list contains a mix of country-specific and IPCC default EFs which are used in the inventory. Some of the EFs are estimated annually (e.g. waste and natural gas), while others are used throughout the time series. The ERT reiterates the recommendation made in the previous review report that the Netherlands review the appropriateness of the IPCC default EFs used, with the aim of calculating more country-specific EFs, giving priority to the fuels with the largest proportions of emissions from fuel combustion, and report on progress in the NIR.

25. The ERT noted that the Netherlands uses data from the European Union emissions trading system (EU ETS) for the verification of some emission estimates. The differences are explained by variations in the coverage of reporting (e.g. the reporting of biomass is not included in the EU ETS data, and industrial processes are not reported under the EU ETS for certain categories). The ERT welcomes this verification activity and reiterates the recommendation made in the previous review report that the Netherlands continue to perform it.

26. The AD used for the estimation of emissions from stationary fuel combustion are derived from the national energy statistics published by CBS. Emissions data from individual companies are also used. According to the NIR, QC checks and procedures are conducted on the emission estimates and certain company data may be rejected and revised. In response to a question raised by the ERT during the review of the 2011 annual submission, the Netherlands indicated that the gaps in emissions data from individual companies are due to the rejection of PRTR data during the first round of QC checks (the local authority review) and the inability of the companies to submit the revised emission estimates in time for the compilation of the inventory. In cases where PRTR data are rejected, the country-specific EFs are used to calculate the emissions from these companies (using data from the national energy statistics and, where possible, plant-specific energy data). This situation only occurs as an exception and the emissions are recalculated when the data from these companies become available. However, the present ERT noted that this process is not transparently reported in the NIR. The ERT reiterates the recommendation made in the previous review reports that the Netherlands improve the transparency of its reporting by including in the NIR a more transparent description of the QC procedures performed for the plant-specific data.

### 2. Reference and sectoral approaches

27. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data.

Table 5
**Review of reference and sectoral approaches**

| | *Paragraph cross-references* |
|---|---|
| Difference between the reference approach and the sectoral approach | Energy consumption: –28.73 PJ, –1.22%<br><br>$CO_2$ emissions: 6,052.34 Gg $CO_2$, 3.80% |
| Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables? | Yes |
| Are differences with international statistics adequately explained? | Yes |
| Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines? | Yes |
| Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines? | Yes |

*Abbreviations*: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

*Comparison of the reference approach with the sectoral approach and international statistics*

28. No problems were identified.

*International bunker fuels*

29. No problems were identified.

*Feedstocks and non-energy use of fuels*

30. No problems were identified.

## 3. Key categories

Stationary combustion: liquid fuels – $CO_2$

31. As noted in the previous stages of the review, the $CO_2$ implied emission factor (IEF) for liquid fuels used in public electricity and heat production decreased by 15.0 per cent between 1990 (76.70 t/TJ) and 2011 (65.20 t/TJ). The IEFs reported for the period 2004–2010 (54.11–63.24 t/TJ) are lower than for all other reporting Parties (54.11–86.77 t/TJ). As in the previous annual submission, the NIR provides a limited explanation for this, noting only the increased consumption of chemical waste gas. In response to a question raised by the ERT in the previous stages of this review, the Netherlands explained that the low IEFs occur due to the hydrogen content in the chemical waste gas which is allocated to this category. The Party also explained that the amount of chemical waste gas and its hydrogen content vary from year to year. To improve the transparency of its reporting, the ERT reiterates the recommendation made in the previous review report that

the Netherlands provide a more transparent description in the NIR, including additional information on the AD and EFs, to justify the low value of the IEF.

Stationary combustion: solid fuels – $CO_2$, $CH_4$ and $N_2O$[3]

32. The Netherlands has reported $CO_2$, $CH_4$ and $N_2O$ emissions from stationary combustion from on-site coke production in iron and steel production plants under iron and steel production. This allocation of emissions is not consistent with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), which require these emissions to be reported under manufacture of solid fuels and other energy industries. In response to a question raised by the ERT during the review, the Netherlands explained that the possibility of reporting the emissions from stationary combustion at the on-site coke production plant has been investigated, but that the current reporting of emissions from combustion in the coke production plant and the iron and steel production plant in the same category provides the most accurate estimate. The Party also provided the ERT with a confidential spreadsheet containing the current $CO_2$ balance for iron and steel production. The ERT concluded that the calculations are in line with the Revised 1996 IPCC Guidelines. The Netherlands also informed the ERT that a table of the trend for the combined iron and steel production emissions, demonstrating time-series consistency, will be included in the next NIR and that an annual $CO_2$ balance will be prepared for review purposes. The ERT commends the Netherlands for the ongoing improvements to the inventory and recommends that the Party include the above-mentioned additional information and a justification for the allocation of the emissions in the NIR and prepare an annual $CO_2$ balance for review purposes.

Road transportation: liquid fuels – $CO_2$

33. According to the previous review report, the Netherlands was planning to update the $CO_2$ EFs for diesel oil and gasoline. However, the ERT noted that in the 2013 annual submission the Party has continued to use the $CO_2$ EFs for diesel oil and gasoline which were derived from an analysis of 50 fuel samples taken in 2004. In response to a question raised by the ERT during the review, the Netherlands explained that TNO investigated the need for an update of the measurement programme and recommended the use of the current country-specific EFs for the entire Kyoto Protocol commitment period. The Netherlands informed the ERT that in preparation for the implementation of the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) the current country-specific $CO_2$ EFs will be re-evaluated. The ERT welcomes this initiative and recommends that the Netherlands report on the progress made and include the findings of this assessment in a future annual submission.

Solid fuel transformation: solid fuels – $CO_2$

34. It was noted in the previous stages of the review that the $CO_2$ IEF for solid fuel transformation fluctuates. For example, it increased from 147,006.85 kg/t in 2007 to 338,287.74 kg/t in 2008 (an increase of 130.1 per cent). In response to a question raised during the previous stages of the review, the Netherlands clarified that the $CO_2$ emissions for this category include both emissions from a coke production plant and from a blast furnace in an iron and steel production plant. The Party further explained that the starting point for the calculations is the $CO_2$ emissions data reported by the company in its environmental report verified by the competent authority. In order to allocate emissions to specific fuels, energy data from the national statistics are used, and some modifications to

[3] Not all emissions related to all gases under this category are key categories, particularly $N_2O$ emissions. However, since the calculation procedures for issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

the EFs are made based on a comparison of the emissions data in the national statistics and the company report. The ERT recommends that the Netherlands improve the transparency of its inventory by including in the NIR a brief description of this issue together with further information on the methodology and EFs used.

Oil and natural gas: liquid and gaseous fuels – $CO_2$

35. It was noted in the previous stages of the review that the $CO_2$ IEF for oil refining/storage decreased by 8.3 per cent between 2010 (396,633.06 kg/PJ) and 2011 (363,888.85 kg/PJ) and that other large inter-annual changes (up to 21.8 per cent) occurred during the period 2007–2011. In response to a question raised by the ERT during the previous stages of the review, the Party explained that emissions data are obtained from the environmental reports of companies while AD are obtained from the national statistics. The Party further explained that there are differences in the definitions of the data reported by companies and in the national statistics. The ERT recommends that the Netherlands explore the possibility of obtaining AD that are consistent with the emissions data, in order to improve the transparency and comparability of its inventory.

36. The ERT noted that the notation key "NE" was used to report $CO_2$ emissions from other leakage (natural gas), with the explanation "no data available (negligible amounts)". The ERT further noted that the Party has reported the AD and $CH_4$ emissions from this category as included elsewhere ("IE"). In response to a question raised by the ERT during the review, the Netherlands confirmed that the $CO_2$ emissions are included under natural gas distribution and stated that it intends to revise the notation key used from "NE" to "IE". The ERT reiterates the recommendation made in the previous review report that the Netherlands review the use of the notation keys, correct the identified error and improve the QC procedures related to the information provided in the CRF tables.

### 4. Non-key categories

Other transportation: gaseous fuels – $CO_2$, $CH_4$ and $N_2O$

37. AD for gaseous fuels in other transportation are reported as "IE" in CRF table 1.A(a)3, whereas the $CO_2$, $CH_4$ and $N_2O$ emissions are reported as not applicable ("NA"). In response to a question raised during the previous stages of the review, the Netherlands explained that this is an error in the CRF table and that both the AD and emissions should be reported as "IE", as the emissions from gas transportation are included in the category energy industries. The ERT recommends that the Netherlands correct this error in order to enhance the transparency of the inventory.

## C. Industrial processes and solvent and other product use

### 1. Sector overview

38. In 2011, emissions from the industrial processes sector amounted to 10,444.88 Gg $CO_2$ eq, or 5.4 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 154.50 Gg $CO_2$ eq, or 0.1 per cent of total GHG emissions. Since the base year, emissions have decreased by 55.6 per cent in the industrial processes sector, and decreased by 71.5 per cent in the solvent and other product use sector. The key driver for the fall in emissions in the industrial processes sector is the installation of emission abatement equipment in the nitric acid production plants; the $N_2O$ emissions from nitric acid production decreased by 95.7 per cent between 2006 and 2011. The other major contributors to the decrease in emissions from the industrial processes sector are related to the production of difluoromonochloromethane (HCFC-22) and the corresponding trifluoromethane (HFC-23) emissions, which decreased by 97.9 per cent during the period 1998–2011, in particular due to the installation of a thermal afterburner, and to aluminium

production and the corresponding PFC emissions, which have decreased by 95.7 per cent since 1995 due to the switch from side-feed to point-feed technology during the period 1998–2003.

39. Within the industrial processes sector, in 2011, 45.6 per cent of the emissions were from chemical industry, followed by 20.8 per cent from consumption of halocarbons and $SF_6$, 15.6 per cent from metal production, 12.4 per cent from mineral products, 3.4 per cent from other (industrial processes) and 2.0 per cent from production of halocarbons and $SF_6$. The remaining 0.2 per cent were from other production.

40. The ERT noted that the rationale and descriptions of the recalculations carried out by the Netherlands are in some cases inaccurate. For example, according to CRF table 8(b), PFC emissions from aluminium production for the period 1999–2007 were recalculated due to more accurate AD. However, the ERT noted that the AD had not changed in the recalculation, whereas the IEFs had changed. The ERT recommends that the Party clearly outline the rationale for all recalculations, and include these explanations in the NIR in order to improve transparency.

## 2. Key categories

Production of halocarbons and $SF_6$ – HFCs

41. The ERT noted from the Monitoring Protocols that the reporting of this category is based on the emissions reported by companies in their environmental reports submitted to the competent authority. The companies are not obliged to report the relevant AD and EFs, which are confidential. According to the NIR, the emission estimates are covered by the general QA/QC procedures whereas, according to the Monitoring Protocols, the competent authorities carry out QA/QC procedures on the data reported by the companies. The ERT reiterates the recommendation made in the previous review report that the Netherlands enhance the category-specific QA/QC procedures to verify the plant-specific information provided by the companies, document these procedures and include this information in the NIR in accordance with the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance).

Consumption of halocarbons and $SF_6$ – HFCs

42. The ERT noted that in the CRF tables, HFC emissions from stocks in industrial refrigeration and mobile air-conditioning are reported, but the AD and IEFs are reported as "NA", "NE" or not occurring ("NO"). The ERT recommends that the Netherlands report the AD and IEFs in order to improve transparency.

43. The ERT noted that, according to the NIR, "from this submission onwards the potential emissions for the period 1990–2011 are included in the CRF". However, in the CRF tables, the potential HFC emissions from production are reported as "NO", and potential HFC emissions from import, export and destroyed amount are reported as "NE" for all years of the time series. The ERT recommends that the Netherlands ensure consistency between the NIR and the CRF tables and encourages the Party to complete and report the potential HFC emissions for the entire time series, in accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories", in order to ensure the completeness of the reporting.

### 3. Non-key categories

Soda ash production and use – $CO_2$

44. The NIR states that there is one company in the Netherlands that produces soda ash using the Solvay process, but in the CRF tables both the AD and the emissions have been reported as "NO" for 2010 and 2011. In response to a question raised by the ERT during the review, the Party explained that the only company that produced soda ash in the Netherlands ceased production in 2009. The ERT recommends that the Party improve its QC procedures to avoid such inconsistencies between the NIR and the CRF tables, and that the Netherlands include the information on the closure of the soda ash production plant in the NIR.

Other production – $CO_2$

45. The ERT noted that in the CRF tables the AD and IEF for $CO_2$ emissions from food and drink are reported as "NA", while the emissions are reported for the entire time series (18.83 Gg $CO_2$ for 2011). The ERT recommends that the Party either include numerical values for the AD and IEF or revise the use of the notation keys to "NE".

Consumption of halocarbons and $SF_6$ – PFCs and $SF_6$

46. The Party has reported in the NIR that potential PFC and $SF_6$ emissions from consumption of halocarbons and $SF_6$ have not been reported due to confidentiality reasons; this was also confirmed by the Party in response to a question raised by the ERT during the review. In CRF table 2(II) potential emissions of perfluoromethane ($CF_4$), perfluoroethane ($C_2F_6$), an unspecified mix of PFCs and $SF_6$ from production are reported as confidential ("C"). The Party uses the notation key "NE" to report the emissions from import, export and destroyed amount for all PFCs and $SF_6$. The ERT encourages the Party to further consider the possibilities of reporting the potential emissions of PFCs and $SF_6$.

## D. Agriculture

### 1. Sector overview

47. In 2011, emissions from the agriculture sector amounted to 16,028.63 Gg $CO_2$ eq, or 8.2 per cent of total GHG emissions. Since the base year, emissions have decreased by 28.9 per cent. The key drivers for the fall in emissions are the reduced number of livestock, the decreased application of animal manure to soil and the decreased use of synthetic fertilizers. Within the sector, in 2011, 40.8 per cent of the emissions were from enteric fermentation, followed by 36.2 per cent from agricultural soils. The remaining 23.0 per cent were from manure management.

48. The ERT noted that the reporting of the methods used for the key categories is not sufficiently transparent and recommends that the Netherlands provide more information in the NIR on the models used and report the key parameter values used for estimating the gross energy intake, methane conversion factors and nitrogen (N) flow.

### 2. Key categories

Enteric fermentation – $CH_4$

49. The ERT noted that in the additional information table of CRF table 4.A the notation keys "NA" and "NE" were used to report additional information concerning mature dairy cattle, mature non-dairy cattle and young cattle. In response to a question raised by the ERT during the review, the Netherlands explained that the additional information table applies only to the animal categories for which a tier 2 method was used. The Netherlands further

explained that emissions from enteric fermentation for mature dairy cattle were modelled (i.e. using a tier 3 method), and the emissions from the other cattle categories were estimated using a method based on the tier 2 method from the Revised 1996 IPCC Guidelines. Since information on rations fed to cattle was available, this information was used instead of energy requirements, and the information to be included in the additional information table was not needed and is therefore not available. The ERT considers that there is a lack of transparency regarding the methods and parameters used, and recommends that the Netherlands include clear and detailed information on the methods and parameter values (such as dry matter intake and feed components) used to calculate the EF for each subcategory of cattle.

50. The Party reported $CH_4$ emissions from enteric fermentation for buffalos as "NE". In response to a question raised by the ERT during the previous review, the Party had explained that buffalos do not occur in the Netherlands. The ERT strongly recommends that the Party correct the notation key to "NO".

51. In the original 2013 annual submission, the Netherlands reported $CH_4$ emissions from enteric fermentation for mules and asses as "NE" for the entire time series. In the NIR, the Party explained that the number of these animals is small and the emissions are therefore not included in the inventory. In response to a question raised by the ERT during the previous stages of the review, the Netherlands stated that the number of mules and asses is being counted in the agricultural census. In response to further questions raised by the ERT during the review, the Party stated that the number of mules and asses became available for the first time in the 2011 agricultural census. The ERT noted that the Revised 1996 IPCC Guidelines include a method and EF for the estimation of $CH_4$ emissions from this category. In response to the list of potential problems and further questions raised by the ERT, the Party officially submitted revised estimates for enteric fermentation of mules and asses for 2010 and 2011. The Netherlands estimated the emissions using the AD from the agricultural census and the default EF from the Revised 1996 IPCC Guidelines. The ERT commends the Party for the improvement in completeness and recommends that the Party clarify whether the activity occurred during the period 1990–2009. If the activity did not occur, the ERT recommends that the Netherlands use the notation key "NO". Otherwise, the ERT recommends that the Party ensure time-series consistency by estimating emissions for the period 1990–2009, using expert judgement and/or recalculation techniques provided in chapter 7 of the IPCC good practice guidance, if AD are not available for these years.

Manure management – $CH_4$ and $N_2O$

52. The ERT noted that in CRF table 4.B(a) the allocation of liquid manure was reported as zero for mature non-dairy cattle, whereas in CRF table 4.B(b), the N excretion in liquid systems for mature non-dairy cattle was reported as 2,605,009.97 kg N in 2011. In response to a question raised by ERT during the review, the Netherlands stated that CRF table 4.B(a) is for $CH_4$ emissions and CRF table 4.B(b) for $N_2O$ emissions. The methods used to estimate the emissions from the two gases differ in terms of the way in which the manure is allocated to liquid, solid and pasture. For $CH_4$ emissions, each animal subcategory is assumed to produce liquid or solid manure exclusively (except laying hens), while taking grazing into account, where applicable. In the method used to estimate $N_2O$ emissions, N excretion values are used instead of data on manure production. In order to split the N excretion into liquid and solid manure management systems, the fraction of the liquid manure management system was used. The Party further explained that it is aware of the differences between the methods used to estimate $CH_4$ and $N_2O$ emissions, and that the issue has been identified as a possible area for improvement, although it is considered to be of low priority. The ERT recommends that the Netherlands improve the consistency between the $CH_4$ and $N_2O$ emission estimates, report thereon and provide the correct values

for the fractions of the different manure management systems in the NIR and the CRF tables.

53. The Netherlands has recalculated the $CH_4$ emissions from manure management for the entire time series. According to the NIR, in the previous annual submissions a methane density of 0.66 kg/m$^3$ was used in the calculation of the EFs for $CH_4$ emissions from manure management. In the 2013 annual submission, the value of 0.67 kg/m$^3$ from the Revised 1996 IPCC Guidelines was used. The ERT welcomes this improvement.

54. The Party reported emissions from manure management for buffalos as "NE". In response to a question raised by the ERT during the previous review, the Party had explained that buffalos do not occur in the Netherlands. The ERT strongly recommends that the Party correct the notation key to "NO".

55. In the original 2013 annual submission, the Party reported "NE" for $CH_4$ emissions from manure management of mules and asses and explained that by the low number of animals (see para. 51 above). The ERT noted that the Revised 1996 IPCC Guidelines include a method and EF for the estimation of $CH_4$ emissions from this category. In response to the list of potential problems and further questions raised by the ERT, the Party officially submitted revised estimates for $CH_4$ from manure management for mules and asses for 2010 and 2011. The ERT recommends that the Netherlands use the notation key "NO" for 1990–2009 if the activity did not occur in these years. Otherwise, the ERT recommends that the Party estimate the emissions for these years (see para. 51 above).

Direct soil emissions – $N_2O$

56. It was noted in the previous stages of the review that the change in the value for fraction of livestock nitrogen excretion that volatilizes as ammonia and nitrogen oxides ($Frac_{GASM}$) from 0.39 in 1990 to 0.17 in 2011 (a decrease of 56.2 per cent) is the largest decrease among all reporting Parties. The values for the period 1990–2007 are higher than the IPCC default value (0.2) and for the period 2008–2011 the values are lower than the IPCC default value. During the previous stages of the review, the Netherlands stated that in 1991 it became mandatory to incorporate manure into soil during application, which greatly reduced the ammonia emissions. Thereafter, dietary improvements and the use of abatement techniques in animal housing have further decreased ammonia emissions. However, the ERT considers that there is insufficient information in the NIR on the abatement techniques applied in animal housing and on how these techniques and dietary improvements have further decreased ammonia emissions. The ERT encourages the Netherlands to include in the NIR detailed information justifying the changes in the values for $Frac_{GASM}$, in order to increase the transparency of its reporting.

Pasture, range and paddock manure – $N_2O$

57. It was noted in the previous stages of the review that the decrease in the value for fraction of livestock nitrogen excreted and deposited onto soil during grazing ($Frac_{GRAZ}$) from 0.28 in 1990 to 0.14 in 2011 (a decrease of 49.2 per cent) is the largest decrease among all reporting Parties. In response to a question raised by the ERT during the previous stages of the review, the Netherlands explained that there is a tendency to keep more dairy cattle completely indoors or to limit grazing. In addition, the number of days spent on pasture has decreased for cattle with unlimited grazing, resulting in lower manure excretions. The ERT considers that there is insufficient information in the NIR on the dairy cattle population that is kept completely indoors or is subject to limited grazing. Therefore, the ERT strongly recommends that the Netherlands provide data on the percentage of cattle that stay indoors completely, the percentage of cattle grazing and the days spent on pasture.

## E. Land use, land-use change and forestry

### 1. Sector overview

58. In 2011, net emissions from the LULUCF sector amounted to 3,265.93 Gg $CO_2$ eq. In 1990, net emissions amounted to 2,999.67 Gg $CO_2$ eq and since that year net emissions have increased by 8.9 per cent. The emissions fluctuate from year to year. Within the sector, in 2011, net emissions of 4,482.37 Gg $CO_2$ eq were from grassland, followed by net removals of 2,433.05 Gg $CO_2$ eq from forest land and net emissions of 816.60 Gg $CO_2$ eq from settlements. Cropland accounted for net emissions of 164.70 Gg $CO_2$ eq, wetlands for net emissions of 134.85 Gg $CO_2$ eq, and other (lime application) accounted for emissions of 73.32 Gg $CO_2$ eq. The remaining net emissions of 27.13 Gg $CO_2$ eq were from other land.

59. Several categories and gases for which there are methodologies and EFs available in the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) are reported as "NE" (see table 3 above), including carbon stock changes in mineral soils. According to the NIR, based on studies by Hanegraaf et al. (2009) and Reijneveld et al. (2009), the Netherlands assumes that mineral soils are not a net source of $CO_2$ emissions over the period 1990–2011. In response to a question raised by the ERT during the review, the Netherlands explained that these studies are based on agricultural soils and that there is no information available for other land uses. The Party also stated that methodological improvements are currently being carried out and that it is planning to include the results in the next annual submission. The ERT reiterates the recommendation made in the previous review report that the Netherlands obtain the data and report the estimates for all the categories currently reported as "NE" for which methodologies and EFs are available in the IPCC good practice guidance for LULUCF.

### 2. Key categories

Grassland remaining grassland – $CO_2$

60. In the CRF tables the Netherlands reported the carbon stock changes in living biomass and dead organic matter as "NE". In response to a question raised by the ERT during the previous stages of the review, the Party explained that in the tier 1 method, carbon stock changes in living biomass and dead organic matter are allocated to the year of conversion to grasslands. As a consequence, no changes in carbon stocks are estimated for these pools in grassland remaining grassland. However, the ERT noted that according to the NIR, all orchards with standard fruit trees, dwarf varieties or shrubs are included in the category grassland. Therefore, the ERT considers that the response provided by the Party did not sufficiently address the issue. The ERT reiterates the recommendation made in the previous review report that the Netherlands obtain the data and report the estimates for pools reported as "NE", for which methods and EFs are available in the IPCC good practice guidance for LULUCF.

### 3. Non-key categories

$N_2O$ emissions from disturbance associated with land-use conversion to cropland – $N_2O$

61. The Netherlands has reported $N_2O$ emissions from disturbance associated with land-use conversion to cropland as "NE". The present ERT noted that recommendations in the previous review report included that the Netherlands use a tier 1 method to estimate $N_2O$ emissions for this category. In response to a question raised by the ERT during the previous stages of the review, the Netherlands explained that because the $CO_2$ emissions from conversion of mineral soils to cropland are not reported, also the $N_2O$ emissions cannot be

reported. The Party also explained that methodological improvements are currently being carried out and that the $N_2O$ emissions from disturbance associated with land-use conversion to cropland will be reported in the next annual submission. The ERT welcomes this plan and reiterates the recommendation made in the previous review report that the Netherlands estimate and report these emissions.

Biomass burning – $CO_2$, $CH_4$ and $N_2O$

62. The Netherlands reported emissions from controlled biomass burning as "NE" for all categories, except for forest land and cropland remaining cropland. In response to a question raised by the ERT during the previous stages of the review, the Party explained that controlled biomass burning no longer occurs in the Netherlands, and it is not allowed as a management activity. The Party also stated that the notation key "NO" would be more appropriate. The ERT further noted that the Party reported biomass burning in cropland remaining cropland as "NA". The ERT reiterates the recommendation made in the previous review report that the Netherlands provide a description of the legislation on controlled biomass burning and reconcile the use of the notation keys for different land-use categories.

63. The ERT noted that the Netherlands has reported $CO_2$, $CH_4$ and $N_2O$ emissions from wildfires in forest land remaining forest land, as recommended in the previous review reports. The ERT commends the Party for this improvement.

## F. Waste

### 1. Sector overview

64. In 2011, emissions from the waste sector amounted to 3,879.01 Gg $CO_2$ eq, or 2.0 per cent of total GHG emissions. Since 1990, emissions have decreased by 69.7 per cent. The key drivers for the fall in emissions are the increase in waste recycling and methane recovery, and the decrease in the organic waste fraction disposed as a result of the implementation of national waste management policies and measures. Within the sector, 81.6 per cent of the emissions were from solid waste disposal on land, followed by 16.9 per cent from wastewater handling and 1.5 per cent from other (compost production). Emissions from waste incineration are reported under the energy sector since all incineration facilities in the Netherlands produce electricity and/or heat.

65. The QA/QC activities in the waste sector are covered by the general QA/QC procedures and by the category-specific QA/QC procedures performed by the inventory compilers. The ERT noted that the NIR does not provide information on which category-specific QA/QC procedures have been implemented. The ERT reiterates the recommendation made in the previous review reports that the Netherlands include information on the category-specific QA/QC procedures and their results in the relevant sections of the NIR, in order to enhance the transparency of its reporting.

66. The ERT noted that the uncertainty assessments have remained at the same level as in previous years, despite the improvements in AD in recent years, and therefore reiterates the recommendation made in the previous review report that the Netherlands provide an explanation of the expert judgement used in the uncertainty assessments for the waste sector.

### 2. Key categories

Solid waste disposal on land – $CH_4$

67. The Netherlands applied the first order decay (FOD) model from the IPCC good practice guidance to estimate $CH_4$ emissions from landfills. The ERT noted inconsistencies between NIR table 8.2 and CRF table 6.A (additional information) regarding the parameters

used in the FOD model. For example, according to the NIR the fraction of degradable organic carbon in municipal solid waste in 2011 was 0.03 but according to CRF table 6.A it was 0.05. In response to a question raised by the ERT during the review, the Party confirmed that the data in NIR table 8.2 are correct. The ERT recommends that the Netherlands rectify those inconsistencies and strengthen its QC activities to avoid such errors.

Wastewater handling – $CH_4$ and $N_2O$[4]

68. The ERT noted inconsistencies between the NIR and the CRF tables regarding the data on the recalculations of $CH_4$ and $N_2O$ emissions from septic tanks. In response to a question raised by the ERT during the review, the Party stated that it had not explained the slight changes to the AD for the calculation of $CH_4$ and $N_2O$ emissions in the NIR. The ERT recommends that the Netherlands include information on all recalculations and data changes in the NIR and the CRF tables, in order to improve the transparency of its reporting.

## G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

### 1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

69. Table 6 provides an overview of the information reported and parameters selected by the Netherlands under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6
**Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol**

| | | *Findings and recommendations* |
|---|---|---|
| Has the Party reported information in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1? | Sufficient | See paragraphs 70 and 72 below |
| Identify any elected activities under Article 3, paragraph 4 | Activities elected: None<br>Years reported: None | |
| Identify the period of accounting | Commitment period accounting | |
| Assessment of the Party's ability to identify areas of land and areas of land-use change | Sufficient | |

Activities under Article 3, paragraph 3, of the Kyoto Protocol

*Afforestation and reforestation – $CO_2$, $CH_4$ and $N_2O$*

70. The Netherlands uses a forest definition of 20 per cent of crown cover and an area of 0.5 ha to define "Forests According to the Kyoto Protocol" (FAD). The Netherlands applies the definition of "Trees Outside Forests" (TOF) for the group of trees that cover an area smaller than 0.5 ha. The Party has reported the gains in carbon stocks in above- and below-

[4] Not all emissions related to all gases under this category are key categories, particularly $CH_4$ emissions. However, since the calculation procedures for issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

ground biomass for the land conversions from TOF to FAD and has reported the carbon losses as "NO" without sufficient justification in the NIR. The ERT noted that this issue was also raised in the previous review reports. In response to a question raised by the ERT during the review, the Netherlands explained that small units of lands with woody cover that do not meet the forest definition according to the Kyoto Protocol may start to meet this definition when adjacent land is afforested or reforested and/or when it is connected to another forest area. This process does not involve a change in land cover or management for these small units of land with woody cover (TOF), though the connection to a larger unit does involve a change in land-use category (from TOF to FAD). In response to the draft annual review report, the Party stated that the description of conversions between TOF and FAD will be improved for the next annual submission, including explicit explanations on the lack of carbon stock changes for each pool. The ERT welcomes this planned improvement and strongly reiterates the recommendation made in the previous review report that the Netherlands provide verifiable information that demonstrates that the pools unaccounted for under the conversions from TOF to FAD are not net sources of emissions, as required by the annex to decision 15/CMP.1.

71. The ERT noted that the Netherlands reported $CO_2$, $CH_4$ and $N_2O$ emissions from wildfires from afforestation and reforestation (units of land not harvested since the beginning of the commitment period) for the first time in the 2013 annual submission, consistent with recommendations made in the previous review report. The ERT commends the Party for this improvement.

*Deforestation – $CO_2$*

72. In the CRF tables under the subcategory FAD converted to TOF, the Netherlands has reported the losses in the carbon stocks as "NO" for the above- and below-ground biomass pools. In response to a question raised by the ERT during the review, the Netherlands explained that deforestation occurs when land is converted from FAD to another land-use category (other than TOF) and that the carbon stock losses in the biomass pool as a result of these conversions are reported under this new land-use category (CRF table 5(KP-I)A.2). At the same time, this deforestation results in the creation of the TOF area as it becomes spatially separated from the larger forest area and no longer meets the minimum size criterion for FAD. The original forest biomass remains intact on the TOF area and the carbon stock changes are reported as "NO" for this area only. In response to the draft annual review report, the Party stated that the description of conversions between TOF and FAD will be improved for the next annual submission, including explicit explanations on the lack of carbon stock changes for each pool. The ERT welcomes this planned improvement and strongly reiterates the recommendation made in the previous review report that the Netherlands provide verifiable information that demonstrates that the pools unaccounted for under the conversions from FAD to TOF are not net sources of emissions, as required by the annex to decision 15/CMP.1.

## 2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

73. The Netherlands has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings included in the standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.[5] The SIAR was forwarded to the ERT prior

[5] The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings and recommendations contained in the SIAR.

74. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

Calculation of the commitment period reserve

75. The Netherlands has reported its commitment period reserve in its 2013 annual submission. The Party reported that its commitment period reserve has not changed since the initial report review (901,135,927 t $CO_2$ eq), as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure.

### 3. Changes to the national system

76. The Netherlands reported that there are no functional changes in its national system since the previous annual submission. However, the name of the former Ministry of Economic Affairs, Agriculture and Innovations changed to the Ministry of Economic Affairs at the end of 2012. This change does not have any impact on the functioning of the national system.

77. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

### 4. Changes to the national registry

78. The Netherlands reported that there are changes in its national registry since the previous annual submission. In its NIR (page 171), the Party described the changes, specifically due to the centralization of the EU ETS operations into a single European Union (EU) registry operated by the European Commission called the Consolidated System of European Union Registries (CSEUR). CSEUR is a consolidated platform which implements the national registries in a consolidated manner and was developed together with the new EU registry.

79. The ERT noted that there were recommendations related to CSEUR in the SIAR that had not been addressed by the Netherlands, in particular those related to the reporting of a description of the changes in the database structure and the reporting of test results. In response to questions raised by the ERT during the review, the Party provided further information on the changes to the national registry, including on the reporting of a description of the changes in the database structure and the reporting of test results.

80. The ERT concluded that, taking into account the confirmed changes in the national registry, including the additional information provided to the ERT during the review, the Netherlands' national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP). With respect to the provision of information related to the database structure, the ERT encourages the Party to provide additional information in the NIR. The

ERT recommends that the Netherlands include all other additional information in response to the SIAR findings in its NIR in accordance with decision 15/CMP.1, annex, chapter I.G.

### 5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

81. The Netherlands reported that there have been limited changes in its activities related to the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since the previous annual submission (see para. 82 below). The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided is complete and transparent.

82. The Netherlands confirmed that its policies on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol are still in place and being executed. The latest developments in this area include active involvement in the formulation of an effective governing instrument for the Green Climate Fund and new market mechanisms. These are seen as important steps in assisting developing countries in climate adaptation and mitigation. Further, the Netherlands will be working more closely with companies and knowledge institutions to contribute to combating climate change and its consequences. The Party is collaborating with various countries in different fields, such as with Colombia, Indonesia and Viet Nam on water-related issues. The Netherlands is preparing two large-scale demonstration projects on carbon dioxide capture and storage. The first project, ROAD, will capture $CO_2$ from a coal-fired power plant with storage in a depleted gas field under the North Sea close to the shore. The second project, the Green Hydrogen Project, is a collaboration of industries from the Netherlands and Denmark with the aim of capturing $CO_2$ from an industrial source, transporting it by ship and injecting it into an oilfield under the North Sea for enhanced oil recovery and consequent storage.

# III. Conclusions and recommendations

## A. Conclusions

83. Table 7 summarizes the ERT's conclusions on the 2013 annual submission of the Netherlands, in accordance with the Article 8 review guidelines.

Table 7
**Expert review team's conclusions on the 2013 annual submission of the Netherlands**

| | | *Paragraph cross-references* |
|---|---|---|
| The ERT concludes that the inventory submission of the Netherlands is complete (categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2011) | | |
| Annex A sources[a] | Not complete | Table 3 |
| LULUCF[a] | Not complete | Table 3 |
| KP-LULUCF | Complete | |
| The ERT concludes that the inventory submission of the Netherlands has been prepared and reported in accordance with the UNFCCC reporting guidelines | Yes | |

| | | *Paragraph cross-references* |
|---|---|---|
| The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1 | Yes | |
| The Party's inventory is in accordance with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* | Yes | 59 |
| The Netherlands has reported information on Article 3, paragraphs 3 and 4, of the Kyoto Protocol | Yes | |
| The Party has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1 | Yes | 73–74 |
| The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1 | Yes | 77 |
| The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions | Yes | 80 |
| Did the Party provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol? | Yes | 81 |

*Abbreviations*: Annex A sources = sources included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

## B. Recommendations

84. The ERT identified the issues for improvement listed in table 8. All recommendations are for the next annual submission, unless otherwise specified.

Table 8
**Recommendations identified by the expert review team**

| *Sector* | *Category* | *Recommendation* | *Paragraph cross-references* |
|---|---|---|---|
| Cross-cutting | QC | Enhance the effective implementation of the tier 1 QC checks for all sectors | Table 3 |

| *Sector* | *Category* | *Recommendation* | *Paragraph cross-references* |
|---|---|---|---|
| | Key categories | Document how the results of the key category analysis have been used for the improvement of the inventory | Table 4 |
| | Inventory management | Provide additional information in the NIR on the archiving procedures for the inventory | 17 |
| Energy | General | Improve the QC procedures to ensure that all information is consistently reported in the NIR, the CRF tables and other national inventory documentation, such as the Monitoring Protocols | 23 |
| | | Review the appropriateness of the IPCC default EFs used, with the aim of calculating more country-specific EFs, giving priority to the fuels with the largest proportions of emissions from fuel combustion, and report on progress in the NIR | 24 |
| | | Continue the verification activities using data from the EU ETS | 25 |
| | | Include in the NIR a more transparent description of the QC procedures performed for the plant-specific data | 26 |
| | Stationary combustion: liquid fuels – $CO_2$ | Provide a transparent description in the NIR, including additional information on the AD and EFs, to justify the low value of the IEF for liquid fuels in public electricity and heat production | 31 |
| | Stationary combustion: solid fuels – $CO_2$, $CH_4$ and $N_2O$ | Include a table of the trend for the combined iron and steel production emissions and a justification for the allocation of the emissions in the NIR and prepare an annual $CO_2$ balance for review purposes | 32 |
| | Road transportation: liquid fuels – $CO_2$ | Report on the progress made regarding re-evaluation of country-specific $CO_2$ EFs and include the findings of the assessment in a future annual submission | 33 |
| | Solid fuel transformation: solid fuels – $CO_2$ | Improve the transparency by including in the NIR a brief description explaining IEF fluctuations, together with further information on the methodology and EFs used | 34 |
| | Oil and natural gas: liquid and gaseous fuels – $CO_2$ | Explore the possibility of obtaining AD that are consistent with the emissions data | 35 |
| | | Review the use of the notation keys, correct the identified error and improve the QC procedures related to the information provided in the CRF tables | 36 |

| *Sector* | *Category* | *Recommendation* | *Paragraph cross-references* |
|---|---|---|---|
| | Other transportation: liquid fuels – $CO_2$, $CH_4$ and $N_2O$ | Correct the identified error in the use of notation keys | 37 |
| Industrial processes and solvent and other product use | General | Clearly outline the rationale for all recalculations, and include the explanations in the NIR | 40 |
| | Production of halocarbons and $SF_6$ – HFCs | Enhance the category-specific QA/QC procedures to verify the plant-specific information provided by the companies, document the procedures and include information in the NIR | 41 |
| | Consumption of halocarbons and $SF_6$ – HFCs | Report AD and IEFs for HFC emissions from stocks in industrial refrigeration and mobile air-conditioning | 42 |
| | | Ensure consistency between the NIR and the CRF tables regarding reporting of potential HFC emissions | 43 |
| | Soda ash production and use – $CO_2$ | Include the information on the closure of the soda ash production plant in the NIR and improve the QC procedures to avoid inconsistencies between the NIR and CRF tables | 44 |
| | Other production – $CO_2$ | Either include numerical values for the AD and IEF or revise the use of the notation key to "NE" | 45 |
| Agriculture | General | Provide more information in the NIR on the models used and report the key parameter values used for estimating the gross energy intake, methane conversion factors and nitrogen flow | 48 |
| | Enteric fermentation – $CH_4$ | Include clear and detailed information on the methods and parameter values (such as dry matter intake and feed components) used to calculate the EF for each subcategory of cattle | 49 |
| | | Correct the notation key used to report emissions from buffalos to "NO" | 50 |
| | | Clarify whether the activity occurred in 1990-2009, and either use the notation key "NO" or estimate emissions from mules and asses for these years | 51 |
| | Manure management – $CH_4$ and $N_2O$ | Improve the consistency between the $CH_4$ and $N_2O$ emission estimates, report thereon and provide the correct values for the fractions of the different manure management systems in the NIR and the CRF tables | 52 |
| | | Correct the notation key used to report emissions from buffalos to "NO" | 54 |

| *Sector* | *Category* | *Recommendation* | *Paragraph cross-references* |
|---|---|---|---|
| | | Clarify whether the activity occurred in 1990-2009, and either use the notation key "NO" or estimate $CH_4$ emissions from mules and asses for these years | 55 |
| | Pasture, range and paddock manure – $N_2O$ | Provide data on the percentage of cattle that stay indoors completely, the percentage of cattle grazing and the days spent on pasture | 57 |
| LULUCF | General | Obtain the data and report the estimates for all the categories currently reported as "NE" for which methodologies and EFs are available in the IPCC good practice guidance for LULUCF | 59 |
| | Grassland remaining grassland – $CO_2$ | Obtain the data and report the estimates for pools reported as "NE", for which methods and EFs are available in the IPCC good practice guidance for LULUCF | 60 |
| | $N_2O$ emissions from disturbance associated with land-use conversion to cropland – $N_2O$ | Estimate and report emissions from this category | 61 |
| | Biomass burning – $CO_2$, $CH_4$ and $N_2O$ | Provide a description of the legislation on controlled biomass burning and reconcile the use of the notation keys for different land-use categories | 62 |
| Waste | General | Include information on the category-specific QA/QC procedures and their results in the relevant sections of the NIR | 65 |
| | | Provide an explanation of the expert judgement used in the uncertainty assessments for the waste sector | 66 |
| | Solid waste disposal on land – $CH_4$ | Rectify the inconsistencies between NIR and CRF tables regarding the parameters used in the FOD model and strengthen the QC activities to avoid such errors | 67 |
| | Wastewater handling – $CH_4$ and $N_2O$ | Include information on all recalculations and data changes in the NIR and the CRF tables | 68 |
| KP-LULUCF | Afforestation and reforestation – $CO_2$ | Provide verifiable information that demonstrates that the pools unaccounted for under the conversions from TOF to FAD are not net sources of emissions, as required by the annex to decision 15/CMP.1 | 70 |
| | Deforestation – $CO_2$ | Provide verifiable information that demonstrates that the pools unaccounted for under the conversions from FAD to TOF are not net sources of emissions, as | 72 |

| *Sector* | *Category* | *Recommendation* | *Paragraph cross-references* |
|---|---|---|---|
| | | required by the annex to decision 15/CMP.1 | |
| National registry | | Include all additional information in the NIR related to the reporting of test results, in accordance with decision 15/CMP.1, annex, chapter I.G | 80 |

*Abbreviations*: AD = activity data, CRF = common reporting format, EF = emission factor, ERT = expert review team, EU ETS = European Union emissions trading system, FAD = "Forests According to the Kyoto Protocol", FOD = first order decay, IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NE = not estimated, NIR = national inventory report, NO = not occurring, QA = quality assurance, QC = quality control, TOF = "Trees Outside Forests".

# IV. Questions of implementation

85. No questions of implementation were identified by the ERT during the review.

# Annex I

## Background data on recalculations and information to be included in the compilation and accounting database

Table 9
**Recalculations in the 2013 annual submission for the base year and the most recent year**

| *Greenhouse gas source and sink categories* | *1990* | *2010* | *1990* | *2010* | *Reason for the recalculation* |
|---|---|---|---|---|---|
| | *Value of recalculation (Gg $CO_2$ eq)* | | *Per cent change* | | |
| **1. Energy** | –198.39 | 37.07 | –0.1 | 0.0 | Changed AD and EFs |
| A. Fuel combustion (sectoral approach) | –198.39 | 37.07 | –0.1 | 0.0 | |
| 1. Energy industries | | 0.07 | | 0.0 | |
| 2. Manufacturing industries and construction | | –13.52 | | 0.0 | |
| 3. Transport | –198.39 | –11.87 | –0.7 | 0.0 | |
| 4. Other sectors | | 62.39 | | 0.1 | |
| 5. Other | | | | | |
| B. Fugitive emissions from fuels | | | | | |
| 1. Solid fuels | | | | | |
| 2. Oil and natural gas | | | | | |
| **2. Industrial processes** | | –22.60 | | –0.2 | Changed AD |
| A. Mineral products | | | | | |
| B. Chemical industry | | | | | |
| C. Metal production | | | | | |
| D. Other production | | | | | |
| E. Production of halocarbons and $SF_6$ | | | | | |
| F. Consumption of halocarbons and $SF_6$ | | –22.55 | | –1.1 | |
| G. Other | | –0.05 | | 0.0 | |
| **3. Solvent and other product use** | | 10.71 | | 6.3 | |
| **4. Agriculture** | 27.91 | 14.58 | 0.1 | 0.1 | Changed AD and EFs |
| A. Enteric fermentation | | 0.22 | | 0.0 | |
| B. Manure management | 28.53 | 14.36 | 0.7 | 0.4 | |
| C. Rice cultivation | | | | | |
| D. Agricultural soils | –0.62 | | 0.0 | | |
| E. Prescribed burning of savannas | | | | | |
| F. Field burning of agricultural residues | | | | | |
| G. Other | | | | | |
| **5. Land use, land-use change and forestry** | –0.28 | –8.80 | 0.0 | –0.3 | Changed AD and EFs |

| *Greenhouse gas source and sink categories* | *1990* | *2010* | *1990* | *2010* | *Reason for the recalculation* |
|---|---|---|---|---|---|
| | *Value of recalculation (Gg $CO_2$ eq)* | | *Per cent change* | | |
| A. Forest land | 6.10 | 8.78 | –0.3 | –0.3 | |
| B. Cropland | | | | | |
| C. Grassland | –6.38 | –31.19 | –0.1 | –0.7 | |
| D. Wetlands | | | | | |
| E. Settlements | | | | | |
| F. Other land | | | | | |
| G. Other | | 13.61 | | 22.8 | |
| **6. Waste** | | –915.93 | | –18.3 | Changed AD and EFs |
| A. Solid waste disposal on land | | –922.77 | | –21.4 | |
| B. Wastewater handling | | 6.84 | | 1.1 | |
| C. Waste incineration | | | | | |
| D. Other | | | | | |
| **7. Other** | | | | | |
| **Total $CO_2$ equivalent without LULUCF** | –170.48 | –876.16 | –0.1 | –0.4 | |
| **Total $CO_2$ equivalent with LULUCF** | –170.76 | –884.96 | –0.1 | –0.4 | |

*Abbreviations*: AD = activity data, EFs = emission factors, LULUCF = land use, land-use change and forestry.

Table 10
**Information to be included in the compilation and accounting database in t $CO_2$ eq for 2011, including the commitment period reserve**

| | *As reported* | *Revised estimates* | *Adjustment*[a] | *Final*[b] |
|---|---|---|---|---|
| **Commitment period reserve** | 901 135 927 | | | 901 135 927 |
| **Annex A emissions for 2011** | | | | |
| $CO_2$ | 167 550 045 | | | 167 550 045 |
| $CH_4$ | 15 261 257 | 15 261 508 | | 15 261 508 |
| $N_2O$ | 9 105 289 | | | 9 105 289 |
| HFCs | 2 132 839 | | | 2 132 839 |
| PFCs | 182 854 | | | 182 854 |
| $SF_6$ | 146 627 | | | 146 627 |
| **Total Annex A sources** | **194 378 911** | **194 379 161** | | **194 379 161** |
| **Activities under Article 3, paragraph 3, for 2011** | | | | |
| 3.3 Afforestation and reforestation on non-harvested land for 2011 | –458 660 | | | –458 660 |
| 3.3 Afforestation and reforestation on harvested land for 2011 | NA, NE, NO | | | NA, NE, NO |
| 3.3 Deforestation for 2011 | 838 670 | | | 838 670 |
| **Activities under Article 3, paragraph 4, for 2011**[c] | | | | |
| 3.4 Forest management for 2011 | | | | |
| 3.4 Cropland management for 2011 | | | | |
| 3.4 Cropland management for the base year | | | | |
| 3.4 Grazing land management for 2011 | | | | |
| 3.4 Grazing land management for the base year | | | | |
| 3.4 Revegetation for 2011 | | | | |
| 3.4 Revegetation in the base year | | | | |

*Abbreviations*: NA = not applicable, NE = not estimated, NO = not occurring.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 11
**Information to be included in the compilation and accounting database in t $CO_2$ eq for 2010**

| | *As reported* | *Revised estimates* | *Adjustment*[a] | *Final*[b] |
|---|---|---|---|---|
| **Annex A emissions for 2010** | | | | |
| $CO_2$ | 181 380 410 | | | 181 380 410 |
| $CH_4$ | 15 935 866 | 15 936 103 | | 15 936 103 |
| $N_2O$ | 9 207 508 | | | 9 207 508 |
| HFCs | 2 259 878 | | | 2 259 878 |
| PFCs | 208 856 | | | 208 856 |
| $SF_6$ | 184 102 | | | 184 102 |
| **Total Annex A sources** | **209 176 619** | **209 176 856** | | **209 176 856** |
| **Activities under Article 3, paragraph 3, for 2010** | | | | |
| 3.3 Afforestation and reforestation on non-harvested land for 2010 | –449 835 | | | –449 835 |
| 3.3 Afforestation and reforestation on harvested land for 2010 | NA, NE, NO | | | NA, NE, NO |
| 3.3 Deforestation for 2010 | 813 375 | | | 813 375 |
| **Activities under Article 3, paragraph 4, for 2010**[c] | | | | |
| 3.4 Forest management for 2010 | | | | |
| 3.4 Cropland management for 2010 | | | | |
| 3.4 Cropland management for the base year | | | | |
| 3.4 Grazing land management for 2010 | | | | |
| 3 4 Grazing land management for the base year | | | | |
| 3.4 Revegetation for 2010 | | | | |
| 3.4 Revegetation in the base year | | | | |

*Abbreviations*: NA = not applicable, NE = not estimated, NO = not occurring.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 12
**Information to be included in the compilation and accounting database in t $CO_2$ eq for 2009**

| | *As reported* | *Revised estimates* | *Adjustment*[a] | *Final*[b] |
|---|---|---|---|---|
| **Annex A emissions for 2009** | | | | |
| $CO_2$ | 169 905 873 | | | 169 905 873 |
| $CH_4$ | 16 123 659 | | | 16 123 659 |
| $N_2O$ | 9 425 607 | | | 9 425 607 |
| HFCs | 2 072 041 | | | 2 072 041 |
| PFCs | 167 974 | | | 167 974 |
| $SF_6$ | 170 383 | | | 170 383 |
| **Total Annex A sources** | **197 865 538** | | | **197 865 538** |
| **Activities under Article 3, paragraph 3, for 2009** | | | | |
| 3.3 Afforestation and reforestation on non-harvested land for 2009 | –441 189 | | | –441 189 |
| 3.3 Afforestation and reforestation on harvested land for 2009 | NA, NE, NO | | | NA, NE, NO |
| 3.3 Deforestation for 2009 | 787 564 | | | 787 564 |
| **Activities under Article 3, paragraph 4, for 2009**[c] | | | | |
| 3.4 Forest management for 2009 | | | | |
| 3.4 Cropland management for 2009 | | | | |
| 3.4 Cropland management for the base year | | | | |
| 3.4 Grazing land management for 2009 | | | | |
| 3.4 Grazing land management for the base year | | | | |
| 3.4 Revegetation for 2009 | | | | |
| 3.4 Revegetation in the base year | | | | |

*Abbreviations*: NA = not applicable, NE = not estimated, NO = not occurring.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13
**Information to be included in the compilation and accounting database in t $CO_2$ eq for 2008**

| | *As reported* | *Revised estimates* | *Adjustment*[a] | *Final*[b] |
|---|---|---|---|---|
| **Annex A emissions for 2008** | | | | |
| $CO_2$ | 175 174 674 | | | 175 174 674 |
| $CH_4$ | 16 084 901 | | | 16 084 901 |
| $N_2O$ | 9 687 125 | | | 9 687 125 |
| HFCs | 1 931 523 | | | 1 931 523 |
| PFCs | 251 071 | | | 251 071 |
| $SF_6$ | 183 791 | | | 183 791 |
| **Total Annex A sources** | **203 313 084** | | | **203 313 084** |
| **Activities under Article 3, paragraph 3, for 2008** | | | | |
| 3.3 Afforestation and reforestation on non-harvested land for 2008 | –403 738 | | | –403 738 |
| 3.3 Afforestation and reforestation on harvested land for 2008 | NA, NE, NO | | | NA, NE, NO |
| 3.3 Deforestation for 2008 | 763 008 | | | 763 008 |
| **Activities under Article 3, paragraph 4, for 2008**[c] | | | | |
| 3.4 Forest management for 2008 | | | | |
| 3.4 Cropland management for 2008 | | | | |
| 3.4 Cropland management for the base year | | | | |
| 3.4 Grazing land management for 2008 | | | | |
| 3.4 Grazing land management for the base year | | | | |
| 3.4 Revegetation for 2008 | | | | |
| 3.4 Revegetation in the base year | | | | |

*Abbreviations*: NA = not applicable, NE = not estimated, NO = not occurring.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

# Annex II

## Documents and information used during the review

### A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

"Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". FCCC/CP/2002/8. Available at <http://unfccc.int/resource/docs/cop8/08.pdf>.

"Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

Status report for the Netherlands 2013. Available at <http://unfccc.int/resource/docs/2013/asr/nld.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2013. Available at <http://unfccc.int/resource/webdocs/sai/2013.pdf>.

FCCC/ARR/2012/NLD. Report of the individual review of the annual submission of the Netherlands submitted in 2012. Available at <http://unfccc.int/resource/docs/2013/arr/nld.pdf>.

UNFCCC. *Standard Independent Assessment Report*, parts I and II. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

## B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Harry Vreuls and Mr. Peter Zijlema (NL Agency), including additional material on the methodology and assumptions used. The following documents[1] were also provided by the Netherlands:

Agentschap NL. 2012. *Afvalverwerking in Nederland. Gegevens 2011.*

Hanegraaf, M.C., Hoffland, E., Kuikman, P.J, Brussaard, L. 2009. *Trends in Soil Organic Matter Contents in Dutch Grasslands and Maize Fields on Sandy Soils*. European Journal of Soil Science, April 2009, 60, 213–222.

Reijneveld, A., van Wensen, J., Oenema, O. 2009. *Soil organic carbon contents of agricultural land in the Netherlands between 1984 and 2004*. Geoderma 152 (2009) 231–238.

Spakman, J., van Loon, M.M.J., van der Auweraert, R.J.K., Gielen, D.J., Olivier, J.G.J, Zonneveld, E.A. 2003. *Method for Calculating Greenhouse Gas Emissions.* Emission Registration Series/Environmental Monitor No. 37b, March 2003: electronic update of No. 37, July 1997.

Tauw. 2011. *Validatie van het nationale stortgasemissiemodel. Herijking van de parameters voor de berekening van emissies van stortgas.*Denventer: Tauw bv.

van den Wyngaert, I.J.J., Arets, E., Kramer, H., Kuikman P.J., Lesschen, J.P. 2012. *Greenhouse Gas Reporting of the LULUCF Sector: Background to the Dutch NIR 2012.* Wageningen: Alterra.

[1] Reproduced as received from the Party.

# Annex III

## Acronyms and abbreviations

| | |
|---|---|
| AD | activity data |
| C | confidential |
| $C_2F_6$ | perfluoroethane |
| $CF_4$ | perfluoromethane |
| $CH_4$ | methane |
| CMP | Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol |
| $CO_2$ | carbon dioxide |
| $CO_2$ eq | carbon dioxide equivalent |
| CRF | common reporting format |
| CSCs | carbon stock changes |
| CSEUR | Consolidated System of European Union Registries |
| DOM | dead organic matter |
| EF | emission factor |
| ERT | expert review team |
| EU | European Union |
| EU ETS | European Union emissions trading system |
| FOD | first order decay |
| $Frac_{GASM}$ | fraction of livestock nitrogen excretion that volatilizes as ammonia and nitrogen oxides |
| $Frac_{GRAZ}$ | fraction of livestock nitrogen excreted and deposited onto soil during grazing |
| GHG | greenhouse gas; unless indicated otherwise, GHG emissions are the sum of $CO_2$, $CH_4$, $N_2O$, HFCs, PFCs and $SF_6$ without GHG emissions and removals from LULUCF |
| ha | hectare |
| HCFC-22 | difluoromonochloromethane |
| HFC-23 | trifluoromethane |
| HFCs | hydrofluorocarbons |
| IE | included elsewhere |
| IEF | implied emission factor |
| IPCC | Intergovernmental Panel on Climate Change |
| ISO | International Organization for Standardization |
| ITL | international transaction log |
| kg | kilogram (1 kg = 1,000 grams) |
| KP-LULUCF | land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol |
| LULUCF | land use, land-use change and forestry |
| $m^3$ | cubic metre |
| N | nitrogen |
| $N_2O$ | nitrous oxide |
| NA | not applicable |
| NE | not estimated |
| NIR | national inventory report |
| NO | not occurring |
| PFCs | perfluorocarbons |
| PJ | petajoule (1 PJ = $10^{15}$ joule) |
| QA/QC | quality assurance/quality control |
| SEF | standard electronic format |
| $SF_6$ | sulphur hexafluoride |
| SIAR | standard independent assessment report |

| | |
|---|---|
| TJ | terajoule (1 TJ = $10^{12}$ joule) |
| UNFCCC | United Nations Framework Convention on Climate Change |